

Drug Safety

Primary Care Medication Safety Surveillance with Integrated Primary and Secondary Care Electronic Health Records: A Cross-Sectional Study

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Electronic Supplementary Material

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1. Indicator random effects on covariate coefficients

Figure 1 and Figure 3 depict indicator-level effects on covariate coefficients (on a log odds scale) for the adjusted models. A separate model was fitted for each covariate using the adjusted models with the covariate effect set to vary over different indicators. Due to convergence issues, patient-level random effects term was not included in models for prescribing indicators. In both figures, indicator labelled as “FE” – fixed effects corresponds to the fixed effect for a given covariate. Indicator effects were calculated as a point estimate of a fixed effect plus predicted conditional modes of indicator random effects on the covariate coefficient. The uncertainty around indicator effects is given by 95% prediction intervals of the underlying random effects only.

For monitoring indicators, for age, all indicators have a similar effect with small variation. There is however, a large variation between indicators in the effect of polypharmacy. So much that M3 and M4 seem to have opposite effects compared with M1 and M2. Also, the fixed effect of polypharmacy is no longer significant. This result needs to be interpreted with caution as it might be an artefact of classification levels of polypharmacy used in this study. Figure 2 shows indicator effects on the coefficient of polypharmacy when the latter is grouped using two categories only: [0, 5] and > 5. Here, the fixed effect of polypharmacy is significant, that is, higher number of medications is associated with less monitoring failures. Conclusions about practice IMD and whether a practice is a training practice from the main text are not affected by adding variable indicator effects into the models. We can see that M3 has the highest effect on practice IMD covariate. The effect of gender seems to be driven by M1.

For prescribing indicators, indicators P15-17 have very different effects compared with the other indicators. This is because these indicators are related to combined hormonal contraception prescriptions and represent quite a different patient population.

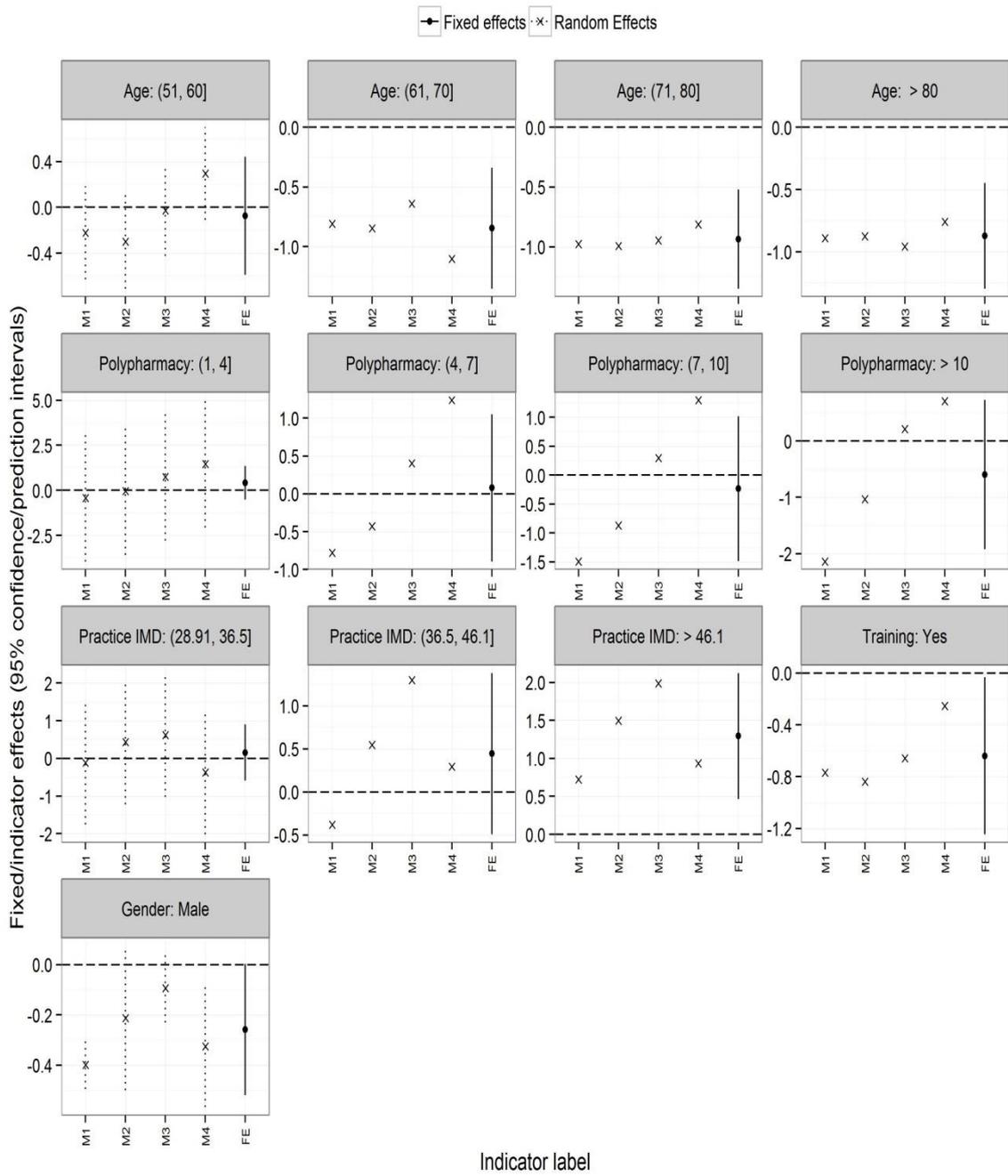


Figure 1. Monitoring indicators' random effects on covariate odds ratios.

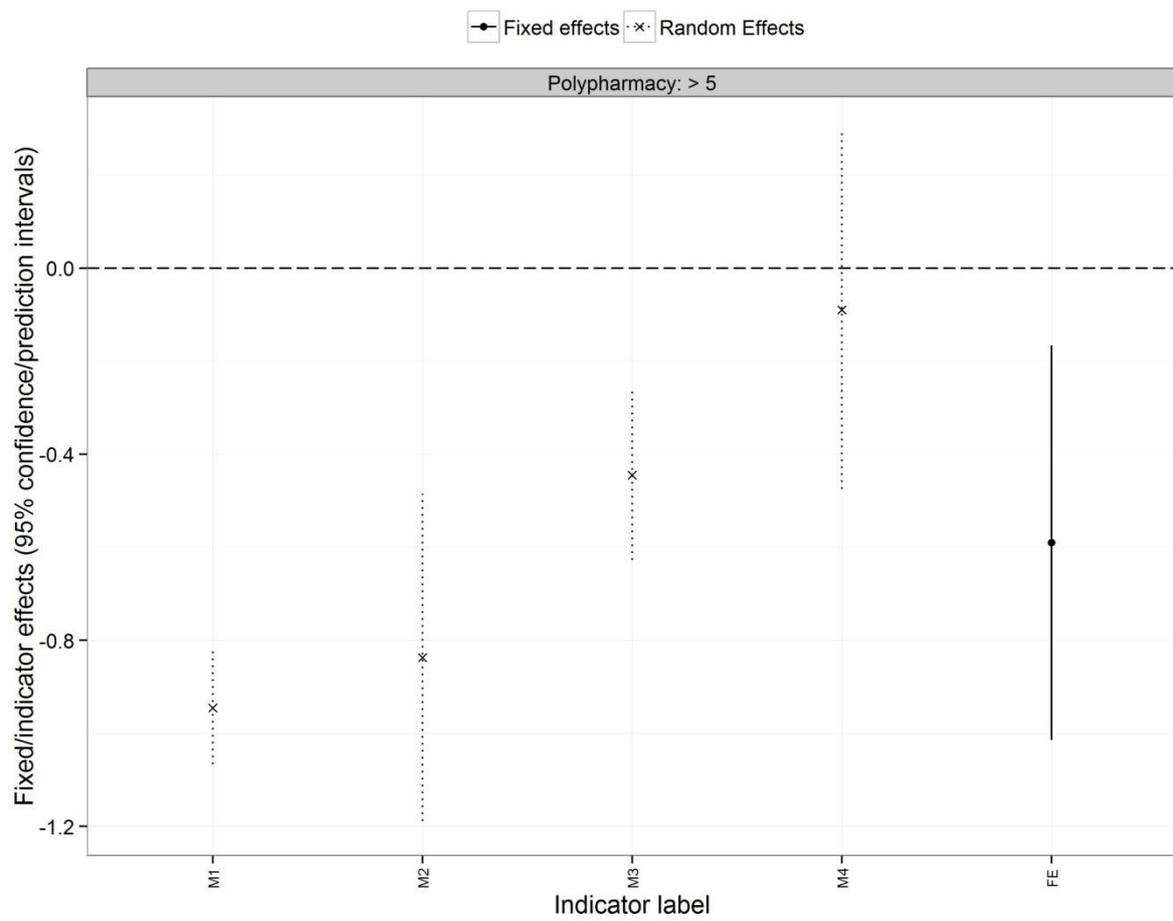


Figure 2. Monitoring indicators' effects on polypharmacy: > 5 vs [0, 5]

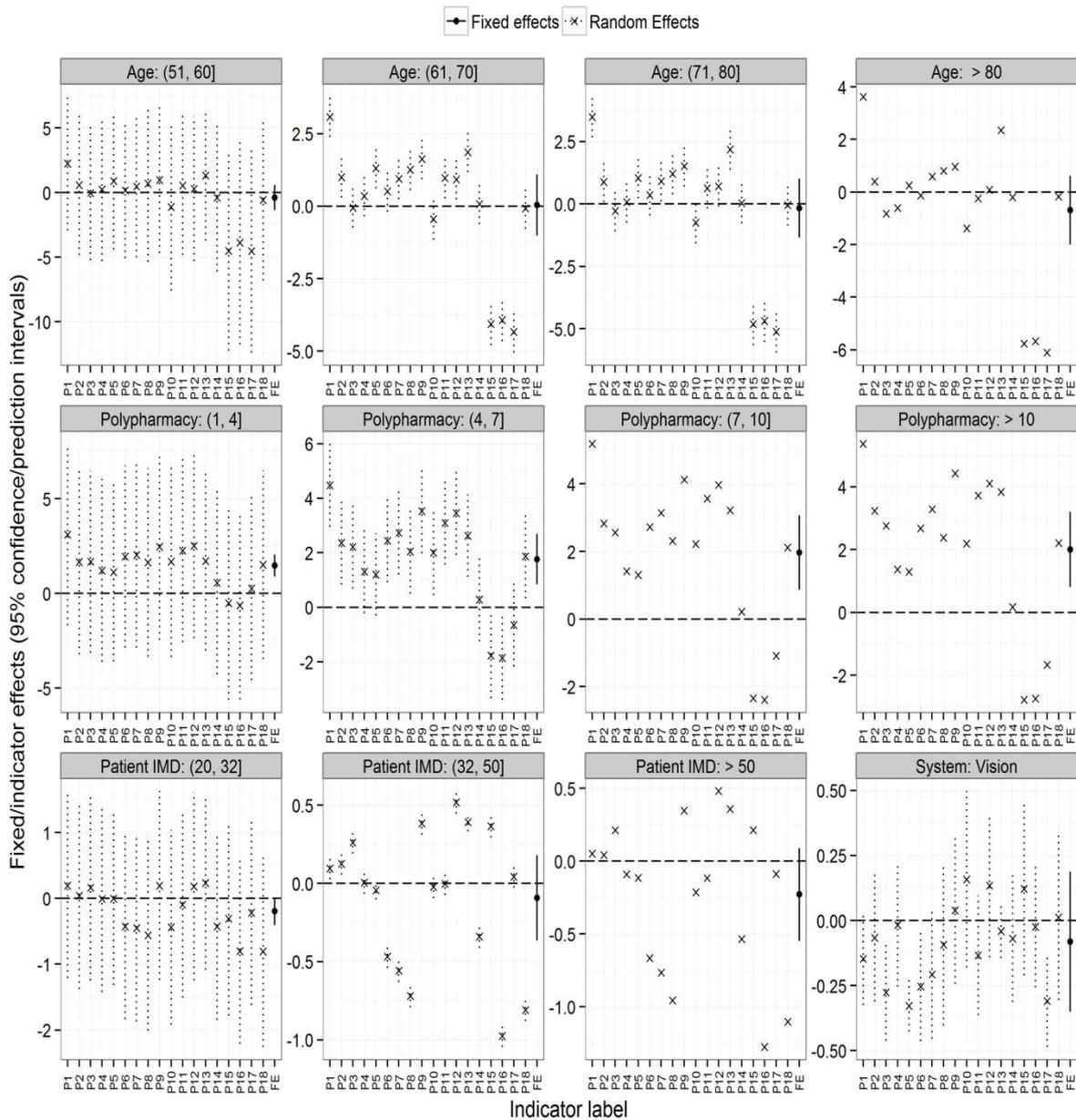


Figure 3. Prescribing indicators' random effects on covariate odds ratios.

2. Polypharmacy

Table 1 shows odds ratios when polypharmacy is defined as the number of drugs with at least two electronic records on different days within the last six months. There are no substantial differences in the resulting odds ratios compared with the polypharmacy defined over the last twelve months in the main text.

Table 1. Estimates of patient and practice level determinants of drug safety indicators (95% confidence interval).

Variable/type	Monitoring indicators		Prescribing indicators	
	Univariate odds ratio	Adjusted odds ratio	Univariate odds ratio	Adjusted odds ratio
<i>Age:</i>				
18 – 50	-	1	-	1
51 – 60	-	1.01 (0.64, 1.6)	-	0.87 (0.75, 1.02)
61 – 70	-	0.5 (0.33, 0.78)	-	1.68 (1.49, 1.9)
71 – 80	-	0.41 (0.28, 0.62)	-	1.3 (1.14, 1.48)
> 80	-	0.44 (0.29, 0.66)	-	0.83 (0.72, 0.97)
<i>Polypharmacy:</i>				
0 – 1	1	1	1	1
2 – 4	0.68 (0.46, 1.01)	0.79 (0.53, 1.19)	2.9 (2.61, 3.22)	2.81 (2.52, 3.13)
5 – 7	0.43 (0.29, 0.63)	0.52 (0.35, 0.78)	4.18 (3.76, 4.66)	4.12 (3.68, 4.63)
8 – 10	0.25 (0.16, 0.37)	0.3 (0.2, 0.46)	6.11 (5.42, 6.88)	6.13 (5.39, 6.97)
> 10	0.21 (0.14, 0.33)	0.26 (0.17, 0.4)	8.57 (7.57, 9.7)	8.47 (7.39, 9.7)
<i>Gender:</i>				
Female	-	1	-	-
Male	-	0.75 (0.64, 0.88)	-	-
<i>Patient IMD</i>				
≤ 20	-	-	1	1
(20, 32]	-	-	0.99 (0.9, 1.1)	0.96 (0.86, 1.06)
(32, 50]	-	-	1.05 (0.95, 1.16)	0.96 (0.87, 1.07)
> 50	-	-	0.99 (0.89, 1.1)	0.85 (0.76, 0.96)
<i>Training:</i>				
No	-	1	-	-
Yes	-	0.5 (0.29, 0.88)	-	-
<i>Practice IMD</i>				
≤ 28.9	-	1	-	-
(28.9, 36.5]	-	1.1 (0.61, 1.97)	-	-
(36.5, 46.1]	-	1.31 (0.73, 2.37)	-	-
> 46.1	-	3.08 (1.73, 5.49)	-	-
<i>GP system:</i>				
EMIS	-	-	1	1
Vision	-	-	0.81 (0.64, 1.04)	0.79 (0.62, 1.01)

3. Alternative reference dates

Figure 4 and Figure 5 depict univariate odds ratios at different reference dates for monitoring and prescribing indicators respectively. It can be seen from both figures that there is no substantial

differences between odds ratios for different reference dates. The polypharmacy time window in both figures is six months.

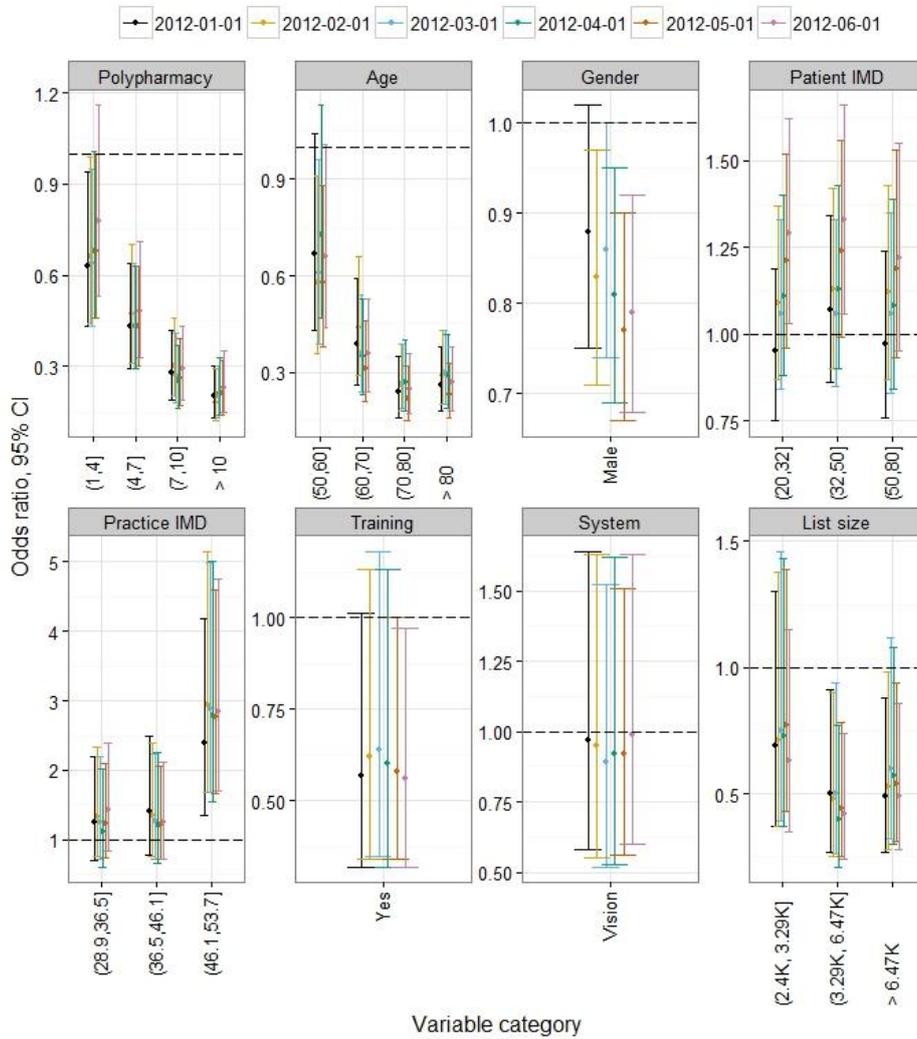


Figure 4. Univariate odds ratios for monitoring indicators.

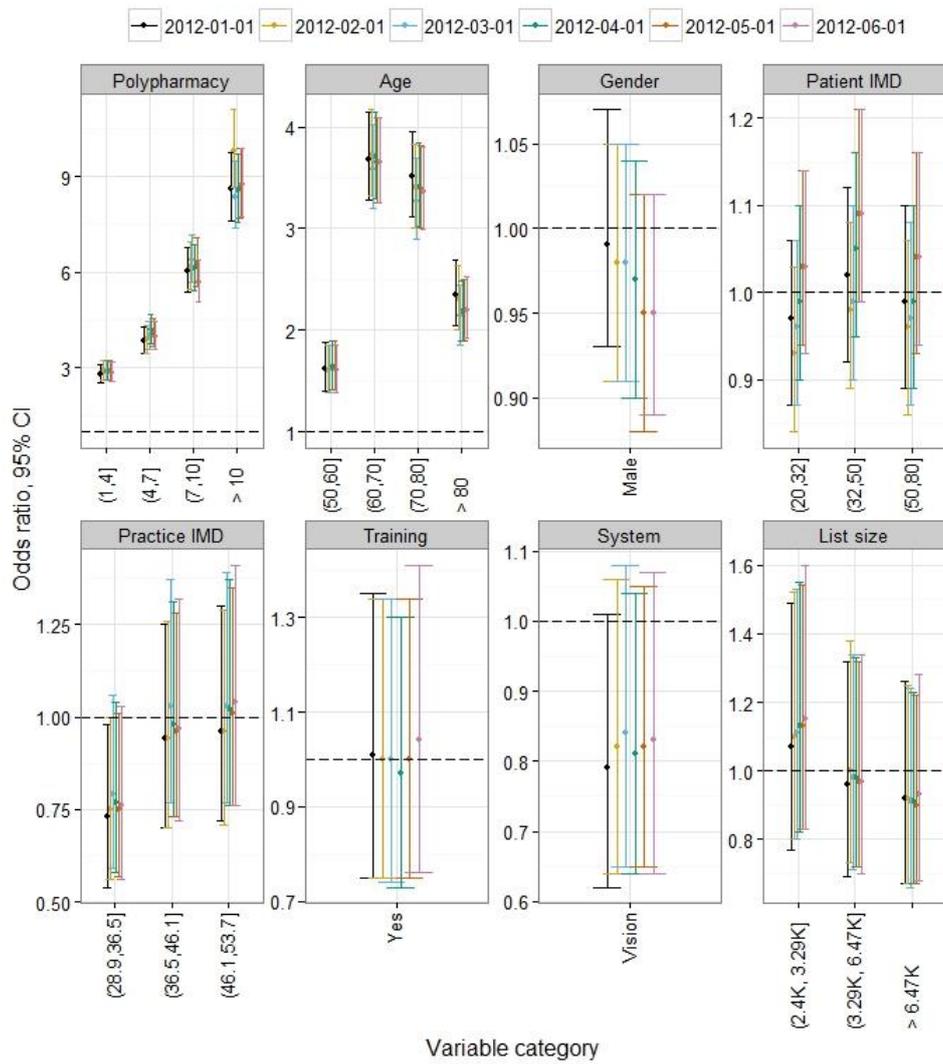


Figure 5. Univariate odds ratios for prescribing indicators.